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1 August 1989

Bill Adams
U.S. EPA Region X
1200 6th Avenue
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Subject: TES IV Contract No. 68-01-7351
Tetra Tech Contract No. 3621-51
U.S. EPA Work Assignment No. R10005
Hydrogeologic Evaluation
Submittal of Final Report - Evaluation of Hydrogeologic Investigation Report, Chemical Processors, Inc. Pier 91 Facility, Seattle, WA.

Dear Bill:

Enclosed are two copies of the Final Hydrogeologic Evaluation Report for Chempro's Pier 91 Facility in Seattle, WA. If you have any questions, please feel free to contract me or Isen Wang at (206)822-9596.

Sincerely,

Jim Jakubiak

Jim Jakubiak
Staff Geologist
Hazardous Materials Management

JJ:gc
JJ1245.b

Enclosures

cc: Lloyd Reed, Jacobs Engineering

U.S. ENVIRONMENTAL PROTECTION AGENCY
TECHNICAL ENFORCEMENT SUPPORT
AT
HAZARDOUS WASTE SITES

TES IV
CONTRACT #68-01-7351
WORK ASSIGNMENT NO. R10005

FINAL REPORT
EVALUATION OF HYDROGEOLOGIC INVESTIGATION REPORT
CHEMICAL PROCESSORS, INC.
PIER 91 FACILITY
SEATTLE, WA

TETRA TECH, INC.
FOR
JACOBS ENGINEERING GROUP, INC.
PROJECT NUMBER: JEG826
TC-3521-51

AUGUST 1989

EVALUATION OF HYDROGEOLOGIC INVESTIGATION REPORT
CHEMICAL PROCESSORS, INC., PIER 91 FACILITY
SEATTLE, WASHINGTON

INTRODUCTION

As a subcontractor to Jacobs Engineering Group, Inc., Tetra Tech was requested by the U.S. Environmental Protection Agency (EPA) to evaluate a hydrogeologic investigation report prepared by Sweet-Edwards/EMCON (1989) for the Chempro Processors, Inc. (Chempro) Pier 91 facility in Seattle, WA. The objective of this review was to determine whether the report was prepared in compliance with the U.S. EPA consent order issued on 30 June 1988 under Section 3013 of the Resource Conservation and Recovery Act (RCRA). The major components of this consent order are as follows:

- Provide a basis for determining of whether hazardous waste or hazardous constituents from the site have been released into soil, surface water, or groundwater

- Include a plan and timetable for a soil boring and groundwater monitoring program

- Propose indicator parameters, justification for selection of parameters, frequency of sampling, procedures, and quality assurance

- Sample and analyze groundwater on at least two separate occasions

- Determine the nature and extent of contamination of the surface and of soil column.

The hydrogeologic investigation report was submitted by the owner and operator, and comprises three volumes. Volume I includes the main text four appendices: Appendix A - logs of exploratory borings, B - photographs, C- chain-of-custody forms, and D - field sampling data sheets. Volume II is Appendix E, a compilation of the laboratory chemical testing results. Volume III contains Appendices F through H, which are trends of organic compound concentrations in soil with depth (F), hydraulic conductivity testing data and analysis (G), and land survey data (H).

GENERAL COMMENTS

The report is technically sound and the field operational procedures appear to have been appropriate. However, two major deficiencies were noted:

- Absence of source identification
- Lack of groundwater monitoring wells in the highly contaminated area identified at the site.

Source identification should have been one of the most important tasks in the site investigation. The location of the contaminant source affects the fate and transport of chemical plumes in both the saturated and the unsaturated zone, and should be fully delineated at the site. The most severely contaminated soil samples were obtained from Borings TB-2, TB-4, and TB-7, and free product was detected in Boring TB-2. However, monitoring wells to examine underlying groundwater were not placed in the immediate vicinity of these borings. Additional groundwater wells are necessary to monitor groundwater quality near these boring locations.

The borings and wells at the site were placed around the perimeter of the tank farm in this phase of site investigation. Groundwater and soil quality under the tank farm are not characterized, except for the area near Boring TB-6 and Well CP-109 (Figure 2-1). Soil and groundwater under the tank farms are in need of further investigation to provide useful information for a detailed site assessment.

The process of the natural biodegradation is suspected in the deep, gravelly sand aquifer, as evidenced by the presence of hydrogen sulfide odor in samples taken. Measurements of dissolved oxygen concentrations in groundwater are recommended for the evaluation of the degree of biological degradation. Baseline quality of the deep aquifer should also be established, although groundwater quality in the deep aquifer was near or below the method detection limits for the variables tested. In addition, a quarterly groundwater monitoring program should be implemented to measure variations in water quality associated with rainfall and tidal effects.

SPECIFIC COMMENTS

Section 1.0 Introduction

According to Item 11 in the consent order, this hydrogeological investigation was to provide a basis for determining whether hazardous waste or hazardous constituents have been released into soil, surface water, or groundwater from the facility, including the former Marine Diesel Oil Yard location. The site boundary and the location of the former Marine Diesel Oil Yard are not shown on the site map. The absence of these details make it difficult for readers to evaluate the extent and completeness of the investigative effort.

Section 2.1 Drilling and Soil/Water Sampling

The field operational procedures appear to have been appropriate during this investigation. However, the disposal destination of the drill cuttings and purged water from well development and water sampling is not presented in the report. The waste disposal procedures should be documented as part of the field operations.

Section 3.2 Hydrogeology

According to the section of tidal effects (page 38), water levels in the shallow aquifer wells did not respond to the tidal fluctuation in Elliott Bay. The hydraulic conductivity of this shallow water-bearing zone is relatively high (estimated to be 10^{-2} cm/sec). The reason for the absence of tidal effect is not discussed. The absence of tidal fluctuation implies either that there is a hydrogeologic boundary between the bay and the site or that the uppermost water body is perched beneath the site. In either case, the fate and transport of contaminants will be affected, and the absence of tidal effects should be discussed and evaluated.

Figure 3-4 graphically expresses that the change in water level in the deep aquifer is a function of distance from Elliott Bay. The graph implies that the tidal influence vanishes 400 ft from the shore in the deep aquifer; however, supporting data for this calculation are not presented.

Section 3.3 Geochemistry

In Section 3.3.1 (page 48), the conductivity unit is expressed in "uS/cm." How is this unit equivalent to the commonly used unit of mmhos/cm or umhos/cm?

Trace concentrations of contaminants were identified in the trip and field blanks, as indicated in Table 3-3 (page 52). The presence of these contaminants may be attributed to laboratory procedures or incomplete decontamination of field sampling equipment. Therefore, the analytical results may be biased and the interpretation may be skewed.

Soil samples for analysis of volatile organic compounds were composited. This procedure was not appropriate because vapor may have escaped during the compositing process. Analytical results of the composite samples can therefore only be utilized for qualitative purposes.

According to Table 3-5, Boring SB-2 cannot be used as a background quality boring because trace amounts of halogenated and aromatic hydrocarbons, were detected in the soil samples. These contaminants are suspected to have originated at the facility.

According to Figure 3-10 (page 91), the highest concentrations of polynuclear aromatic hydrocarbons occur in the west central portion of the study area, but concentration isopleths appears to be distorted because of lack of data control points on the west limb of the plume. Additional investigation should be pursued on the west along Wells CP-107, CP-104, and CP-105.

CONCLUSIONS

Chempro provided a relevant site investigation for the Pier 91 facility. Except for the technical weaknesses mentioned above, the report appears to be in compliance with the 3031 consent order. Additional work should focus on the source identification and the establishment of an adequate groundwater monitoring system. A quarterly groundwater monitoring program is recommended to monitor the fate and transport of contaminants originating at the site.

REFERENCES

Sweet-Edwards/EMCON. 1989. Hydrogeologic investigation, Pier 91 facility, Chemical Processors, Inc. Prepared for U.S. Environmental Protection Agency Region 10, Seattle, Washington. SE/E, Bothell, WA.